TEST PROCEDURE

WP 002A

Title	Page Number
Electric Dynamometer Coefficient Estimation	1 of 10
Originator	**Supersedes**
Marty Reineman	WP 002
Responsible Organization	**Computer Program**
Vehicle Testing	Elec Dyno Coeff
Type of Test Report	**Data Form Number**
Form	Form WP 002-01
Report Distribution	**Implementation Date**
Emission Planning and Strategies	10-18-95

Implementation Approval

Original Test Procedure Authorized by EPCN #181 on 02-27-95

Revision Description

(1) 10-18-95 The purpose of this change is to revise the procedure as described in EPCN #190. All steps affected by this change are identified with (1) in the margin.

Note: Specific brand names in EPA/EOD procedures are for reference only and are not an endorsement of those products.

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Attachments

1. Purpose

(1) The purpose of this procedure is to document the steps required to provide estimated A, B, and C coefficients for setting the Horiba 48-inch electric dynamometer road load. These coefficients do not simulate vehicle air-conditioning (A/C) loading.

Form WP 002-01 is to be used with this procedure.

2. Test Procedure

101 Go to room 516 and, if not already on, turn on the Macintosh computer that has the database named "Elec Dyno Coefficients" stored on it. Double-click on this file and enter the password.

The program will open to a start-up screen. Click on the "Enter the initial coastdown data" button.

This will switch to "Initial Input" screen (Attachment A) that will allow you to enter today's date and the data related to the vehicle.

Note: If you click on the "Find last report and print it" button the program will automatically find the last data entered and print the corresponding report and return to the start-up screen.

102 Click on the "New Record" button to get a blank input screen and enter the initial vehicle data. Do not write over or change any existing data.

103 Click on the "Print Forms" button. This will automatically print Form WP 002-01 (Attachment B), which will have the initial vehicle data you entered recorded on the form.

The program will automatically switch to the "Electric Dynamometer Coefficient Data Input" screen (Attachment C), which is where you will later enter the data obtained in Steps 105 through 107.

104 Locate the vehicle. Any time the vehicle needs to be moved, it may be driven. If any problems are encountered with the vehicle, contact the EF Project Officer.

105 Record the required data and follow the instructions in Steps 1.0 through 10.0, as described on Form WP 002-01.

106 Step 11.0 of Form WP 002-01 requires you to transcribe the data to the Horiba Electric Dyno database. Locate the Horiba Dyno Computer and open the “Vehicle Classes” database.

Transcribe the data as follows:

Vehicle ID. = Vehicle Class Name
Equivalent Test Weight = Dyno Set Inertia
Total Weight = Vehicle Weight
Drive Axle Weight = Driving Wheel Weight
Enter 0 (zero) for the Dynamometer Set and Target A, B, and C coefficients

(1) **Note:** The computer program corrects the coefficients to produce dynamometer coefficients without an additional vehicle air conditioning load. This is accomplished by inputting the A/C adjusted coast down time and multipling the resulting C-set coefficient by 0.9.

107 Continue following the instructions and recording data as required on Form WP 002-01 until the coastdowns have been completed, the remaining data is transcribed to the Horiba computer, and the “Electric Dynamometer Coefficient Estimation Report” (Attachment D) is printed.

108 Distribute the reports as described on WP 002-01.

3. Acceptance Criteria

The following criteria must be met for the coastdown to be valid:

3.1 Only one drive-axle may be indicated on the “Electric Dynamometer Coefficient Estimation Report.”

3.2 The vehicle fuel tank must be drained and then filled to 40% of the tank volume.

3.3 The vehicle total weight must be equal to the sum of the drive-axle and the non-drive-axle weight.

3.4 The vehicle must soak at 68-86 °F for a minimum of 4 hours, immediately before the coastdown.

3.5 The drive-axle tire pressure must be within ±1.0 psi of the manufacturer’s recommended tire pressure before the coastdown.

3.6 The non-drive-axle tire pressure must be within ±1.0 psi of the manufacturer's recommended tire pressure before the coastdown.

3.7 The coastdown measurements must begin within 1 minute of the end of the drive-axle and non-drive-axle warm-ups.

3.8 The "Dynamometer Set Road Load Coefficients" must meet the following:

$0 < A < 75$ lb

$-2.5 < B < 2.5$ lb/mph

$0 < C < 0.09$ lb/(mph)^2

(1) 3.9 The A, B, and C "Target Road Load" coefficients should be entered as zero in the Horiba Dyno Computer database menu.

(1) 3.10 The technician who performed the procedure records his/her assigned Environmental Protection Agency ID# on Form WP 002-01.

Initial Input

Click on the “New Record” button before entering the data

New Record

Enter the Today’s Date, Vehicle ID., Manufacturer, Model, Model year, and Drive Axle information.

Today's Date _____

Vehicle ID _____

Manufacturer _____

Model _____

Model Year _____

Drive Axle, Front ☐ Rear ☐

Print Forms

Electric Dynamometer Coefficient Estimation Data

1.0 Record the Today's Date, Vehicle ID., Manufacturer, Model, Model year, and Drive Axle information.

Today's Date _____

Vehicle ID _____

Manufacturer _____

Model _____

Model Year _____

Drive Axle, Front ☐ Rear ☐

2.0 Drain the vehicle fuel tank and fill it to 40% of the volume. Record the total volume and 40 % gallons.

Fuel Tank Volume _____ gallons

40% Fuel Tank Volume _____ gallons

3.0 With the driver in the vehicle, weigh the drive axle, non-drive axle, and the total vehicle. Record these weights.

Drive Axle Weight with Driver _____ pounds

Non-Drive Axle Weight with Driver _____ pounds

Total Weight _____ pounds

4.0 Record the Equivalent Test Weight

Equivalent Test Weight _____ pounds

5.0 Record the Tire Manufacturer Make and Size. Record the Vehicle Manufacturer's Recommended Pressure.

Make, Front _____ Size, Front _____ Recommended psi, Front Tire _____

Make, Rear _____ Size, Rear _____ Recommended psi, Rear Tire _____

6.0 Set the tire pressure to 5 psi above the manufacturers recommended pressure. Record these pressure settings.

Drive tire pressure set to: _____ psi

Non-drive tire pressure set to: _____ psi

7.0 Park the vehicle in the soak area for a minimum of 4 hours. Record the soak start date and time.

Soak Start Date _____ Soak Start Time _____

8.0 Record the soak end date and time

Soak End Date _____ Soak End Time _____

9.0 Record the Clayton AHp.

Clayton 50 mph AHp _____ hp

10.0 Record the A/C adjusted 55-45 mph coastdown time.

Coastdown Time _____ seconds

11.0 Transcribe the data from Form WP 002-01 to the electric dynamometer computer.

Vehicle ID. = Vehicle Class Name, Equivalent Test Weight = Dyno Set Inertia, Total Weight = Vehicle Weight, and the Drive Axle Weight = Driving Wheel Weight.

Enter 0 (zero) for the Dynamometer Set and Target A, B, and C coefficients.

12.0 If necessary, warm-up the dynamometer, update the Auto Calibration Offset , the Span values, and the Parasitic Loss Calibration Curve.

13.0 Drive the vehicle into the test cell and place the drive axle tires on the dynamometer.

13.1 Restrain the non-drive wheels using the wheel chock system. Use the cross tie cables for front wheel drive vehicles.

Electric Dynamometer Coefficient Estimation Data

Today's Date _____

Vehicle ID _____

13.2 Position the front cooling fan.

13.3 Reduce the drive axle tire pressure to the vehicle manufacturer's recommended tire pressure ± 1.0 psi.

Final drive axle tire pressure set to: _____ psi

14.0 Warm-up the drive axle tires for 25 minutes by motoring the dynamometer at 50 mph. The driver must be in the vehicle, with the dynamometer emergency stop button within reach, the engine on, A/C off, and the transmission in neutral.

15.0 Within 1 minute of the end of the warm-up, run one 70-10 mph coastdown with 5 mph speed intervals.

16.0 When the coastdown is complete, exit the vehicle and use the Horiba computer Alt - P command twice to print 2 copies of the tabular summary report.

17.0 Label the reports "Drive Axle."

18.0 Enter the measured coastdown coefficients for the drive axle into the data base.

19.0 Place the non-drive axle tires on the dynamometer.

19.1 Restrain the drive wheels using the wheel chock system. Use the cross tie cables as necessary.

19.2 Position the front cooling fan.

19.3 Reduce the non-drive axle tire pressure to the vehicle manufacturer's recommended tire pressure ± 1.0 psi.

Final non-drive axle tire pressure set to: _____ psi

20.0 Warm-up the non-drive axle tires for 25 minutes by motoring the dynamometer at 50 mph. The driver must be in the vehicle, with the dynamometer emergency stop button within reach, and the transmission in neutral.

21.0 Within 1 minute of the end of the warm-up, run one 70-10 mph coastdown with 5 mph speed intervals.

22.0 When the coastdown is complete, exit the vehicle and use the Horiba computer Alt - P command twice to print 2 copies of the tabular summary report .

23.0 Label the reports "Non-drive Axle."

24.0 Return to the Macintosh and transcribe all the required data from this form and the 2 tabular summary reports for the drive axle and non-drive axle measured coastdown coefficients into the Electric Dynamometer Coefficient Estimation data base.

Push the Print Reports button. This will automatically print 2 copies of the report.

25.0 Transcribe the Dynamometer Set Coefficients into the Horiba electric dynamometer computer Vehicle Classes data base. Leave the Target Coefficients set to zero.

26.0 Give Form WP 002-01, the 2 Horiba tabular reports and one copy of the Electric Dynamometer Coefficients Report to the EF Project Officer. Give the remaining reports to EOD Large-roll Dyno Project Officer.

I have performed all steps in accordance with the requirements of WP 002.

Technician's Name: _____ Date: _____

The data entries are accurate and meet the requirements of WP 002.

Verified by: _____ Date: _____

Electric Dynamometer Coefficient Data Input

Follow the directions on Form WP 002-01 and perform the coastdowns. When completed, return to this computer and enter the remaining required data.

When all of the data has been entered, push the "Print Report" button

Vehicle ID _____

Manufacturer _____ Today's Date _____

Model _____

Model Year _____

Drive Axle, Front ☐ Rear ☐

Fuel Tank Volume _____ gallons

40% Fuel Tank Volume _____ gallons

Dive Axle Weight with Driver _____ pounds

Non-Drive Axle Weight with Driver _____ pounds

Total Weight _____ pounds

Equivalent Test Weight _____ pounds

Tire Make, Front _____

Tire Size, Front _____

Recommended psi, Front Tire _____

Tire Make, Rear _____

Tire Size, Rear _____

Recommended psi, Rear Tire _____

Drive tire pressure set to: _____ psi

Non-drive tire pressure set to: _____ psi

Soak Start Date _____

Soak Start Time _____

Soak End Date _____

Soak End Time _____

Clayton 50 mph AHp _____ hp

A/C Adjusted Coastdown Time _____ seconds

Final drive tire pressure set to: _____ psi

Final non-drive tire pressure set to: _____ psi

Drive Axle A _____

Drive Axle B _____

Drive Axle C _____

NonDrive Axle A _____

NonDrive Axle B _____

NonDrive Axle C _____

Technician Name _____

Form Verified By : _____ Date: _____

SAMPLE

Electric Dynamometer Coefficient Estimation Report

Vehicle ID: _____ Today's Date: _____

Manufacturer: _____ Model: _____ Model Year: _____

Technician Name: _____

Drive Axle, Front ☐

Rear ☐

Fuel Tank Volume: _____ gallons

40% Fuel Tank Volume: _____ gallons

Dive Axle Weight with Driver: _____ pounds

NonDrive Axle Weight with Driver: _____ pounds

Total Weight: _____ pounds

Equivalent Test Weight: _____ pounds

Tire Make, Front: _____ Rear: _____

Tire Size, Front: _____ Rear: _____

Recommended psi, Front: _____ psi Rear: _____ psi

Drive tire pressure set to: _____ psi

Non-drive tire pressure set to: _____ psi

Final drive tire pressure set to: _____ psi

Final non-drive tire pressure set to: _____ psi

Soak Start Date: _____

Soak Start Time: _____

Soak End Date: _____

Soak End Time: _____

Clayton 50 mph AHp: _____ hp

A/C Adjusted Coastdown Time: _____ seconds

Drive Axle A: _____ NonDrive Axle A: _____ Dyno Set Road Load A: _____

Drive Axle B: _____ NonDrive Axle B: _____ Dyno Set Road Load B: _____

Drive Axle C: _____ NonDrive Axle C: _____ Dyno Set Road Load C: _____

Quality Checks: _____

If there are any "Quality Checks" flags, document the reason, if known, in the comments section.

Comments: _____

I verify that Form WP 002 data was transcribed correctly.

Verified By : _____ Date: _____